

G03F007/20 ;
G03F009/00 ; H01L021/30

ABSTRACTED-PUB-NO: EP 90924A

BASIC-ABSTRACT: An image forming mask (21) comprises a glass substrate (22) having transparent light transmission zones (24,25) sepd. by opaque masking zones (23) of deposited chromium. The resolution of the image formed by projecting at least partially coherent light through the mask is improved by coating alternate transmission zones with a transparent material of different refractive index to that of the material, normally air, in the intervening transmission zones so that destructive interference occurs between light diffracted at adjacent zones.

The coated transmission material (26) has a thickness such that $(n-1)d = \phi \times \lambda$ where n is its refractive index, λ is the wavelength of the incident light, and ϕ is a fraction between $1/4$ and $3/4$ but pref. $1/2$. The transmission material is pref. polymeric and most pref. polymethyl methacrylate.

The mask is used in photolithography to produce very narrow width line images on photo-resist wafers. The mask produces an image with enhanced definition.

ABSTRACTED-PUB-NO: EP 90924B

EQUIVALENT-ABSTRACTS: An image forming mask (21) comprises a glass substrate (22) having transparent light transmission zones (24,25) sepd. by opaque masking zones (23) of deposited chromium. The resolution of the image formed by projecting at least partially coherent light through the mask is improved by coating alternate transmission zones with a transparent material of different refractive index to that of the material, normally air, in the intervening transmission zones so that destructive interference occurs between light

diffracted at adjacent zones.

The coated transmission material (26) has a thickness such that $(n-1)d = \phi \times \lambda$ where n is its refractive index, λ is the wavelength of the incident light, and ϕ is a fraction between $1/4$ and $3/4$ but pref. $1/2$. The transmission material is pref. polymeric and most pref. polymethyl methacrylate.

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CHOSEN-DRAWING: Dwg.2/2 Dwg.2/2

TITLE-TERMS:

IMAGE RESOLUTION PHOTOLITHOGRAPHIC TRANSMISSION MASK IMPROVE
ALTERNATE LIGHT
TRANSMISSION MATERIAL REFRACT INDEX

DERWENT-CLASS: A89 G06 P83 P84 U11

CPI-CODES: A04-F06E; A12-E07C; A12-L02B; G06-D06; G06-E02;

EPI-CODES: U11-C04A;

POLYMER-MULTIPUNCH-CODES-AND-KEY-SERIALS:

Key Serials: 0231 0500 3011 0535 3317 2594 2595 2654 3258 3267
3279 2805 2807

Multipunch Codes: 013 04- 074 077 081 082 431 477 50& 516 522 523
524 57& 575

58& 596 623 627 643 651 658 688

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: C1983-100033

Non-CPI Secondary Accession Numbers: N1983-183758

CLIPPEDIMAGE= JP402034854A
PAT-NO: JP402034854A
DOCUMENT-IDENTIFIER: JP 02034854 A
TITLE: MASK, EXPOSING DEVICE, AND SEMICONDUCTOR ELEMENT

PUBN-DATE: February 5, 1990

INVENTOR-INFORMATION:

NAME

TERASAWA, TSUNEO
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KATAGIRI, SOUICHI
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ASSIGNEE-INFORMATION:

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HITACHI LTD

COUNTRY

N/A

APPL-NO: JP01013905

APPL-DATE: January 25, 1989

INT-CL_(IPC): G03F001/08; H01L021/027

US-CL-CURRENT: 430/396

ABSTRACT:

PURPOSE: To improve the resolving power of a fine pattern by gradually varying the phase difference of irradiating light, which transmits an aperture, between 0° and around 180° by stages.

CONSTITUTION: The irradiating light which transmits the aperture pattern 1 is given phase difference which is different at five regions such as from 1-1 to 1-5, i.e., at the region 1-1, 1-2, 1-3, 1-4, and 1-5, are given phase difference by 0°, 45°, 90°, 135°, and 180°, respectively. The part whose adjoined aperture is connected at one end, a pattern is formed without separating by varying continuously or by stages near the this connecting part. Thus, a fine pattern can be transferred without the occurrence of resolving defect.

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CLIPPEDIMAGE= JP357062052A
PAT-NO: JP357062052A
DOCUMENT-IDENTIFIER: JP 57062052 A
TITLE: ORIGINAL PLATE TO BE PROJECTED FOR USE IN TRANSMISSION

PUBN-DATE: April 14, 1982

INVENTOR-INFORMATION:

NAME
SHIBUYA, MASATO

ASSIGNEE-INFORMATION:

NAME	COUNTRY
NIPPON KOGAKU KK <NIKON>	N/A

APPL-NO: JP55136483
APPL-DATE: September 30, 1980

INT-CL_(IPC): G03F001/00
US-CL-CURRENT: 430/300

ABSTRACT:

PURPOSE: To form an original plate high in resolution, limit, while the light of the same wavelength and the same projection lenses as those of the conventional method are used, by providing a specified phase-regulating member in the transparent part of the original plate.

CONSTITUTION: A $\lambda/2$ plate 3 (λ is the wavelength of an incident coherent light) is arranged in a part of the transparent part 1 (at least one of both the sides of the part 1) which composes an original grating plate (the original plate to be projected for use in transmission illumination) together with the opaque part 2. The desired plate is thus formed.

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CLIPPEDIMAGE= JP361292643A
PAT-NO: JP361292643A
DOCUMENT-IDENTIFIER: JP 61292643 A
TITLE: PHOTOMASK

PUBN-DATE: December 23, 1986

INVENTOR-INFORMATION:

NAME

TERASAWA, TSUNEO
KUROSAKI, TOSHISHIGE
KAWAMURA, YOSHIO
MORIYAMA, SHIGEO

ASSIGNEE-INFORMATION:

NAME

HITACHI LTD

COUNTRY

N/A

APPL-NO: JP60134138

APPL-DATE: June 21, 1985

INT-CL_(IPC): G03F001/00; H01L021/30

US-CL-CURRENT: 430/5

ABSTRACT:

PURPOSE: To form both of a phase shift layer removed at openings and that remaining there with one time of exposure by exposing a resist film applied onto a light shading film with exposure energy partly different, and forming a resist pattern different in thickness between the phase shift layer at the openings to be removed and at those to be left as it is.

CONSTITUTION: An SiO₂ film 2 is vapor deposited on a glass base 1, the light shading film 3 of Cr is vapor deposited on the film 2, and it is coated with the resist 6. It is exposed to light having the pattern of the openings, with a different exposure energy at each part of the pattern, resulting in perfectly removing the pattern parts 4-2, 4-4 of the resist pattern after development processing, and reducing the film thickness to about their halves at the pattern parts 4-1, 4-3, 4-5. The openings 4-2, 4-4 are

dimensions of
the light shielding pattern 5 requires only $1 \sim 2 \mu\text{m}$, a
normal reticule
pattern plotting method can easily form the pattern. When the
transmissivity
is changed in accordance with the dimensions of the opening
pattern 4, the
arrangement density of the light shield-pattern 5 can be
adjusted.

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CLIPPEDIMAGE= JP362067547A
PAT-NO: JP362067547A
DOCUMENT-IDENTIFIER: JP 62067547 A
TITLE: PHOTOMASK

PUBN-DATE: March 27, 1987

INVENTOR-INFORMATION:

NAME

TERASAWA, TSUNEO
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KUROSAKI, TOSHISHIGE
KAWAMURA, YOSHIO

ASSIGNEE-INFORMATION:

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HITACHI LTD

COUNTRY

N/A

APPL-NO: JP60206664

APPL-DATE: September 20, 1985

INT-CL_(IPC): G03F001/00; H01L021/30

US-CL-CURRENT: 430/5

ABSTRACT:

PURPOSE: To make larger the contrast of light transmitting a fine independent opening pattern close to a resolution limit and to transfer other opening patterns on a wafer at high dimension accuracy by arranging plural fine light shielding patterns on at least one opening pattern.

CONSTITUTION: Plural fine light shielding patterns 5 with dimensions smaller than transfer-enable ones are arranged on the opening pattern 4, do not transfer an image as a pattern, but reduce luminous energy transmitting the opening pattern 4. As a result, the transmissivity of the opening pattern 4 is lower than that of the opening pattern 3. Accordingly, even if an exposure amount is increased, corresponding to the opening pattern 3, the dimensions of the transfer pattern of the opening pattern never become larger. In a photomask for a 1/10 reduction projection exposure device, the

formed by
etching the Cr layer 3 and further etching the SiO₂
layer 2 with
diluted HF, and the remaining resist is vertically dry etched to
reduce the
film thickness to remove the resist of the pattern parts 4-1,
4-3, 4-5, and the
Cr layer 3 is again etched and finally, all the resist remaining
on the surface
is removed.

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CLIPPEDIMAGE= JP362092438A
PAT-NO: JP362092438A
DOCUMENT-IDENTIFIER: JP 62092438 A
TITLE: FORMING METHOD FOR PATTERN

PUBN-DATE: April 27, 1987

INVENTOR-INFORMATION:

NAME

ATODA, NOBUFUMI
YAMAKOSHI, YOSHIKI
SATO, HIROKUNI

ASSIGNEE-INFORMATION:

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AGENCY OF IND SCIENCE & TECHNOL

COUNTRY

N/A

APPL-NO: JP60232617

APPL-DATE: October 18, 1985

INT-CL (IPC): H01L021/30; G03F001/00 ; G11C011/14

US-CL-CURRENT: 430/396

ABSTRACT:

PURPOSE: To form a super-fine pattern by forming a mask of two types of films having equal amplitude of transmitting lights or X-rays and or its odd times of phase difference, thereby obtaining high resolution to the degree of wavelength.

CONSTITUTION: When transmitting waves (lights or X-rays) from component substances 7, 8 adjacent in equal width of a mask 3 made of the substances 7, 8 of mask patterns of difference substances have equal amplitude and phases of π or its odd times different, transmitting intensity distribution obtained on a resist film 2 becomes as shown. That is, the lights or X-rays which arrive at points X1, X2 on the film 2 corresponding to the boundary of the substances 7, 8 through the portions of the substances 7, 8 cancel each other so that the intensity becomes zero. This is irrespective of a distance (g)

between the mask 3 and the film 2 and the size of the pattern.
Thus, high
resolution to the order of the wavelength can be provided.

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CLIPPEDIMAGE= JP362189468A
PAT-NO: JP362189468A
DOCUMENT-IDENTIFIER: JP 62189468 A
TITLE: PHOTOMASK

PUBN-DATE: August 19, 1987

INVENTOR-INFORMATION:

NAME

KUROSAKI, TOSHISHIGE
TERASAWA, TSUNEO
KAWAMURA, YOSHIO
MORIYAMA, SHIGEO

ASSIGNEE-INFORMATION:

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HITACHI LTD

COUNTRY

N/A

APPL-NO: JP61030833

APPL-DATE: February 17, 1986

INT-CL_(IPC): G03F001/00; H01L021/30

US-CL-CURRENT: 430/5

ABSTRACT:

PURPOSE: To simplify reticle forming stages and to improve the reliability of a pattern by forming a substrate for an opening by thinning it by the prescribed amount in order to give a phase difference to exposure light transmitting a specific opening.

CONSTITUTION: Cr being a light blocking film 2 is deposited at 800Å; on a glass substrate 1, and thereon a photoresist 5 is applied to expose the pattern of the opening. When the Cr is etched by nitric acid, and the glass substrate by diluted acid fluoride, openings 3-2 and 3-4 are formed. The the remaining resist is dry-etched in a vertical direction to reduce the film thickness, and resists in pattern parts 3-1, 3-3 and 3-5 are removed. When the Cr is again etched by nitric acid, five openings are formed, and finally all the remaining resists are removed, thereby completing the reticle.

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CLIPPEDIMAGE= JP401147458A
PAT-NO: JP401147458A
DOCUMENT-IDENTIFIER: JP 01147458 A
TITLE: PHOTOMASK

PUBN-DATE: June 9, 1989

INVENTOR-INFORMATION:

NAME

TERASAWA, TSUNEO
KUROSAKI, TOSHISHIGE
KATAGIRI, SOUICHI

ASSIGNEE-INFORMATION:

NAME

HITACHI LTD

COUNTRY

N/A

APPL-NO: JP62305633

APPL-DATE: December 4, 1987

INT-CL (IPC): G03F001/00; H01L021/30

US-CL-CURRENT: 430/5

ABSTRACT:

PURPOSE: To simultaneously transfer a fine pattern on a wafer possessing level difference, as well by changing the phase difference of a illuminating light which transmits an adjacent opening part in response to different focus positions in an exposure region.

CONSTITUTION: The thickness of the phase shift layers 2 is varied so that different phase difference are given to the patterns 4-1, 4-2, 5-1, 5-2, 6-1 and 6-2 on both sides of the fine patterns 4∼6 to be transferred. When the phase difference is 180°, resolving power improves most at the correct focusing position. When the phase difference is <180°, the plane whose resolving power improves most moves closer to a condenser from the correct focusing position, and when the phase difference is >180°, it moves in an opposite direction and the position of the best image plane is changed owing to

the phase difference change. Thus, when such variation is set in response to the wafer level difference, the fine patterns are simultaneously transferred to each focusing position.

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CLIPPEDIMAGE= JP401283925A
PAT-NO: JP401283925A
DOCUMENT-IDENTIFIER: JP 01283925 A
TITLE: ELEMENT FORMING METHOD

PUBN-DATE: November 15, 1989

INVENTOR-INFORMATION:

NAME

FUKUDA, HIROSHI
TERASAWA, TSUNEO
HASEGAWA, NORIO
TANAKA, TOSHIHIKO
OSHIMA, TAKU

ASSIGNEE-INFORMATION:

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HITACHI LTD

COUNTRY

N/A

APPL-NO: JP63112422

APPL-DATE: May 11, 1988

INT-CL_(IPC): H01L021/30; G03F001/00 ; G03F007/20 ; H01L021/30
US-CL-CURRENT: 430/311

ABSTRACT:

PURPOSE: To obtain minute elements characterized by a simple constitution and large throughputs in the formation of a disk pattern having a very minute pattern, by using a phase shifting mask which imparts the phase difference to neighboring light with respect to the exposure of the very minute pattern, and using a transmitting type mask for the other pattern region.

CONSTITUTION: A phase shifting mask is used for the exposure of the very minute pattern of a device, and an ordinary transmitting type mask is used for the exposure of the other pattern. Thus the reduced projection exposure is performed. Namely, the patterns of the object device are divided into two regions; i.e., the closely assembled region of the very minute patterns each having a simple repeating structure and the circuit regions such as control

target pattern 6 is formed. Then, the resist 4 is removed; an electron-beam resist 7 is applied to the whole surface; an Al film 8 for electrification-preventing use is formed on it. After that, a phase-shift pattern is drawn by using an electron beam 9. Then, the film 8 is removed; a developing operation is executed; a resist pattern 4' is formed.

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CLIPPEDIMAGE= JP402078216A
PAT-NO: JP402078216A
DOCUMENT-IDENTIFIER: JP 02078216 A
TITLE: MANUFACTURE OF PHOTOMASK

PUBN-DATE: March 19, 1990

INVENTOR-INFORMATION:

NAME

HASEGAWA, NORIO
TANAKA, TOSHIHIKO
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TERASAWA, TSUNEO
KIMURA, SHINICHIRO

ASSIGNEE-INFORMATION:

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HITACHI LTD

COUNTRY

N/A

APPL-NO: JP63228669

APPL-DATE: September 14, 1988

INT-CL_(IPC): H01L021/027

US-CL-CURRENT: 430/5

ABSTRACT:

PURPOSE: To prevent a substrate from being electrified during a drawing operation of a phase-shift pattern by a method wherein, when the phase-shift pattern is exposed by using an electron beam, a process provided with an electrification-preventing means is used.

CONSTITUTION: A light-shielding film 2 composed of Cr is formed on a glass substrate 1. Then, an original-picture pattern composed of transmission parts 2-1 to 2-3 and an alignment target pattern 2-4 are formed simultaneously. Then, a phase-shift layer 3 is applied to the whole surface. Then, a resist 4 is applied to the whole surface; then, the layer 4 and the layer 3 are removed only in an alignment target part 5. After that, the substrate 1 is etched by making use of a Cr film of the pattern 2-4 as a mask; a U-shaped alignment

CLIPPEDIMAGE= JP402140743A
PAT-NO: JP402140743A
DOCUMENT-IDENTIFIER: JP 02140743 A
TITLE: MASK AND ITS PRODUCTION

PUBN-DATE: May 30, 1990

INVENTOR-INFORMATION:

NAME

OKAMOTO, YOSHIHIKO

ASSIGNEE-INFORMATION:

NAME

HITACHI LTD

COUNTRY

N/A

APPL-NO: JP63295350

APPL-DATE: November 22, 1988

INT-CL (IPC): G03F001/08; H01L021/027

US-CL-CURRENT: 430/5

ABSTRACT:

PURPOSE: To improve the transfer precision of a pattern on a mask by allowing the light transmitted through a transparent film or a phase shift groove and the light transmitted through a part, where they are not formed, to interfere in each other at the time of exposure so that they are weakened by each other in the boundary part between a transmission area and a light shielding area or in the end part of the light shielding area.

CONSTITUTION: When a negative of a prescribed integrated pattern on a mask 1a is transferred onto a wafer by the reduction exposure method or the like, 180deg; phase difference is generated between the light transmitted through a transparent film 4a and the light transmitted through a normal transmission area B in each transmission area B of the mask 1a. Since the transparent film 4a is arranged in the end part of each metallic layer 3, among the light transmitted through one transmission area B, the light transmitted through the

transparent film 4a and the light transmitted through the normal transmission area B are weakened by each other in boundary parts between the transmission area B and adjacent light shielding areas A and A. Consequently, the modulation of the light intensity distribution on the wafer is considerably improved.

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CLIPPEDIMAGE= JP402210250A
PAT-NO: JP402210250A
DOCUMENT-IDENTIFIER: JP 02210250 A
TITLE: METHOD AND DEVICE FOR DETECTING FAULT OF PHOTOMASK

PUBN-DATE: August 21, 1990

INVENTOR-INFORMATION:

NAME

TERASAWA, TSUNEO
HASEGAWA, NORIO
TANAKA, TOSHIHIKO
FUKUDA, HIROSHI
KUROSAKI, TOSHISHIGE

ASSIGNEE-INFORMATION:

NAME

HITACHI LTD

COUNTRY

N/A

APPL-NO: JP01262880

APPL-DATE: October 11, 1989

INT-CL_(IPC): G01N021/88; G03F001/08 ; H01L021/027 ; H01L021/66

ABSTRACT:

PURPOSE: To detect the fault of a transparent film or a transparent foreign matter in a light transmission part by illuminating a photomask with coherent light having specified wavelength.

CONSTITUTION: The photomask 5 mounted on a sample table 4 is illuminated with the light from a coherent light source 1 through a wavelength selection filter 2 and a condensing lens 3 and the sample table 4 is moved by a driving means 6 and a laser measuring device 7 measures the position. The transmitted light passes through a condensing lens 8 and forms the image of the photomask pattern on an image pickup element 9. The signal of the element 9 is controlled by a camera controller 10 and inputted in a comparison decision circuit 17 through an image memory 12, then compared with design data by the circuit 17. When a faulty area 24 exists in the transparent thin film 21 provided on

the opening
parts 20-1 and 20-2 on the photomask, which is shown by a figure
A, a dark line
part 25 along the contour of the faulty part is generated in the
image
transmitted to the circuit 17, which is shown by a figure B. It
is because the
light interferes at a boundary part since the wavelength of the
coherent light
is so selected that its phase may be inverted by the thin film
21, whereas the
fault of the thin film is known.

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CLIPPEDIMAGE= JP402211450A
PAT-NO: JP402211450A
DOCUMENT-IDENTIFIER: JP 02211450 A
TITLE: PHASE SHIFT MASK AND ITS MANUFACTURE

PUBN-DATE: August 22, 1990

INVENTOR-INFORMATION:

NAME

USUI, YOICHI

HAMAGUCHI, SHINICHI

ASSIGNEE-INFORMATION:

NAME

FUJITSU LTD

COUNTRY

N/A

APPL-NO: JP01032337

APPL-DATE: February 10, 1989

INT-CL_(IPC): G03F001/08; H01L021/027

US-CL-CURRENT: 430/5

ABSTRACT:

PURPOSE: To eliminate a change with the lapse of time in the membrane property of a shifter, to eliminate reflection on the boundary surface with a transparent substrate, and to facilitate film thickness control by forming a recessed part of specific depth as the shifter in the transparent substrate.

CONSTITUTION: The shifter 13 consisting of the recessed part of the depth (D) satisfying an equation is formed in the glass substrate 11. Here, λ is the wavelength of irradiating light and (n) is the refractive index of the shifter. Then a light shielding pattern 12 made of Cr, etc., is formed on, for example, the substrate 11, and a specific conductive film 14 and a positive resist film 15 are laminated in order by coating and then exposed by an electron beam exposing method and developed to remove the exposed part of the film 15. Then the film 14 is etched, and the substrate 11 is dry-etched to

•

remove the films 15 and 14, thus forming the phase shifting mask.

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CLIPPEDIMAGE= JP402211451A
PAT-NO: JP402211451A
DOCUMENT-IDENTIFIER: JP 02211451 A
TITLE: EXPOSURE MASK, MANUFACTURE OF EXPOSURE MASK, AND EXPOSING
METHOD USING
THE SAME

PUBN-DATE: August 22, 1990

INVENTOR-INFORMATION:
NAME
NITAYAMA, AKIHIRO

ASSIGNEE-INFORMATION:
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TOSHIBA CORP

	COUNTRY
	N/A

APPL-NO: JP01031084
APPL-DATE: February 13, 1989

INT-CL (IPC): G03F001/08; H01L021/027
US-CL-CURRENT: 430/5

ABSTRACT:

PURPOSE: To make the light intensity distribution of a mask sharp and to eliminate the need for an auxiliary pattern by providing a 2nd transmission area which shifts the phase of light transmitted through a 1st transmission area by a specific angle in the 1st transmission area.

CONSTITUTION: On a mask substrate 1, a couple of mask layers 2 for obtaining a specific pattern are deposited, and 1st transmission areas 3 are formed of the substrate 1 exposed inside the layers 2. Then, 2nd transmission areas 4 consisting of grooves formed by etching are formed inside the areas 3 and lithography light transmitted through the areas 3 is shifted in phase by 180° . Here, the depth of the grooves is represented as $\lambda/2(n-1)$, where λ is the wavelength of the light and (n) is the refractive index of the substrate 1; and quartz, etc., are usable for the substrate 1 and Cr,

etc., are usable for the layers 2.

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CLIPPEDIMAGE= JP362059296A
PAT-NO: JP362059296A
DOCUMENT-IDENTIFIER: JP 62059296 A
TITLE: PEPTIDE DERIVATIVE

PUBN-DATE: March 14, 1987

INVENTOR-INFORMATION:

NAME

MIMURA, TSUTOMU
KOHAMA, YASUHIRO
FUKAYA, TSUTOMU
WATANABE, MASAHIRO
YOKOYAMA, KAZUMASA

ASSIGNEE-INFORMATION:

NAME

GREEN CROSS CORP:THE

COUNTRY

N/A

APPL-NO: JP60198606

APPL-DATE: September 10, 1985

INT-CL_(IPC): C07K005/06; C07K007/06 ; A61K037/02 ; A61K037/02

ABSTRACT:

NEW MATERIAL:The compound of formula

R<SB>1</SB>-Pro-Hyp-R<SB>2</SB>

(R<SB>1</SB> is hydrophobic group; R<SB>2</SB> is hydrophilic group).

EXAMPLE:

N-3-(4-hydroxyphenyl)propionyl-L-prolyl-L-hydroxyprolyl-glycyl-L-glycine.

USE: An antiplatelet agent. It can be administered as a peroral agent as well as injection.

PREPARATION: The objective compound of formula wherein

R<SB>1</SB> is group of

formula II and R<SB>2</SB> is Gly-Ala-Gly can be produced e.g. by reacting the

compound of formula Pro-Hyp(OBzl)-Gly-Ala-Gly-OBzl (Bzl is benzyl) with the

compound of formula I (R<SB>3</SB> is OH or H; n is 1∼8) [e.g.

3-(4-benzyloxyphenyl)propionic acid] preferably in the presence of a

condensation agent such as N,N'- dicyclohexylcarbodiimide in a solvent such as DMF at 0~50°C for 2~20hr.

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CLIPPEDIMAGE= JP362067514A
PAT-NO: JP362067514A
DOCUMENT-IDENTIFIER: JP 62067514 A
TITLE: PHOTOMASK

PUBN-DATE: March 27, 1987

INVENTOR-INFORMATION:

NAME

TERASAWA, TSUNEO
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KUROSAKI, TOSHISHIGE
KAWAMURA, YOSHIO

ASSIGNEE-INFORMATION:

NAME

HITACHI LTD

COUNTRY

N/A

APPL-NO: JP60206665

APPL-DATE: September 20, 1985

INT-CL (IPC): G02F001/00; H01L021/30

US-CL-CURRENT: 430/5

ABSTRACT:

PURPOSE: To transfer an aperture pattern close to a resolution limit at high accuracy by forming a fine 2nd aperture pattern in the vicinity of the 1st aperture pattern and installing a phase shifting layer on either one of the 1st and 2nd aperture patterns.

CONSTITUTION: The individual width of the fine aperture patterns 5a and 5d installed at both sides of the aperture pattern 4 is set to a small value so that each one cannot be resolved by a reduction projection exposure device. The thickness of the phase shifting layer 2 installed on the aperture patterns 5b and 5c is a value rotating the phase of light transmitting the aperture patterns 5b and 5c by 180°. When a pattern is transferred on a wafer through the use of such a photomask, only the light transmitting the aperture pattern 4 is largely transmitted, whereas the light transmitting

the aperture
patterns 5b and 5c is not highly transmitted as the
above-mentioned light.
However, the light transmitting the aperture patterns 5b and 5c
prevent the
light amplitude distribution of the light transmitting the
aperture pattern 4
from getting wider horizontally more than necessary.

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CLIPPEDIMAGE= JP360109228A
PAT-NO: JP360109228A
DOCUMENT-IDENTIFIER: JP 60109228 A
TITLE: PROJECTION EXPOSING DEVICE

PUBN-DATE: June 14, 1985

INVENTOR-INFORMATION:

NAME

SHINTANI, YOSHIO

ASSIGNEE-INFORMATION:

NAME

HITACHI LTD

COUNTRY

N/A

APPL-NO: JP58216165

APPL-DATE: November 18, 1983

INT-CL_(IPC): H01L021/30; G03F007/20

ABSTRACT:

PURPOSE: To contrive the reduction of the total exposure time required by reduced projection onto wafers or photomask substrates by providing plural reticle pattern image forming systems inside the device which is so constituted that images of reticle patterns are formed in plural positions of a substance to be exposed such as a wafer respectively by said image forming systems and at the same time, exposure is performed.

CONSTITUTION: By reduced patterns PA and PB or reticles 3 and 4 which are projected onto a wafer W, respective reticle patterns 3 and 4 are exposed on the surface of wafer W simultaneously. When the wafer W is moved by 1-chip pitch in X-direction, patterns PA' and PB' are projected next to the above PA and PB and patterns PA' and PB' are similarly exposed at a time. After that, this operation is repeated and after the wafer W is moved by about a size of radius in X-direction, it is moved in Y-direction by 1-chip pitch and next in right-X direction intermittently whereas completing the similar

exposure. As a
result, a pattern of the reticle 3 is exposed in a right half of
the wafer W
and a pattern of the reticle 4 is exposed in the left half.
Accordingly,
exposure of two chips are performed for the wafer W at a time.

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CLIPPEDIMAGE= JP360107835A
PAT-NO: JP360107835A
DOCUMENT-IDENTIFIER: JP 60107835 A
TITLE: PROJECTION EXPOSURE DEVICE

PUBN-DATE: June 13, 1985

INVENTOR-INFORMATION:

NAME

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ASSIGNEE-INFORMATION:

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N/A

APPL-NO: JP58216465

APPL-DATE: November 17, 1983

INT-CL (IPC): H01L021/30; G03F007/20

US-CL-CURRENT: 118/506

ABSTRACT:

PURPOSE: To expose a circuit pattern with excellent yield even when foreign matter adheres on a reticle surface by arranging a semitransparent mirror between a reticle and a projection lens and overlapping and exposing the same plural number of reticle original pictures on a wafer through the mirror when the reticle original pictures are projected and exposed onto the wafer by using the lens.

CONSTITUTION: Beams from an illumination light source 2 are projected to a reticle 1 through a shutter 7 connected to a shutter driving mechanism 8 and a condenser lens 3, beams transmitted through the reticle 1 are projected to a projection lens 4 through a semitransparent mirror 10 consisting of two prisms 10A and 10B, and focussed beams are projected onto a wafer 5 placed on a step-feed stage 6. In the constitution, another light source 11 is fitted on the side of the mirror 10, and beams from the light source 11 are

projected
similarly to the mirror 10 through a shutter 12, a condenser lens
13 and a
reticle 9 having quite the same pattern as the reticle 1.
Accordingly, the
wafer is exposed by images overlapped by the reticles 1 and 9,
and an adverse
effect by foreign matter is eliminated.

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CLIPPEDIMAGE= JP402098119A
PAT-NO: JP402098119A
DOCUMENT-IDENTIFIER: JP 02098119 A
TITLE: EXPOSURE DEVICE

PUBN-DATE: April 10, 1990

INVENTOR-INFORMATION:

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APPL-NO: JP63250303

APPL-DATE: October 4, 1988

INT-CL_(IPC): H01L021/027; G03F009/00

US-CL-CURRENT: 430/396

ABSTRACT:

PURPOSE: To make the title exposure device optimum for manufacturing semiconductor devices by a method wherein the light flux from a lighting source of a lighting system is divided into two light fluxes of exposure light and non-exposure light by a light dividing means to lead them onto a mask surface and a wafer surface.

CONSTITUTION: A pattern on a mask 8 surface is irradiated with an exposure light reflected by a cold mirror 3 out of light flux from a light source after unifying the light flux by a fly eye lens 5 through a shutter 4 further through a mirror 6. Then, the exposure light is projected on a water 10 surface at specified magnification. On the other hand, the heat ray of non-exposure light passing through another mirror 3 is cut off by a heat ray filter 21 to be led to the right and left side observation system by a light guide 23. Condenser lenses 24a, 24b converges light flux from the light guide 23 to

irradiate the
mask 8 surface using respective elements on the optical path
reaching objective
lenses 28a, 28b for lighting the alignment mark on the water 10
surface. In
such a constitution, the title exposure device can be
miniaturized and
simplified by using only one light source 1.

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